

# Critical Factors That Affect The Success Of Business Intelligence Systems (BIS) Implementation In An Organization

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**Abstract:** - As more organizations move towards intelligent IT infrastructure, nowadays, Business Intelligence Systems (BIS) become a more widely used IT solution. Even though it is a widely used IT solution, many BIS implementations are not successful because they are time consuming and expensive. The benefits of BIS can be achieved if the system is implemented successfully. This paper explores the critical success factors (CSFs) that effect BIS implementation both from the perspectives of management and technology. Also, based on literature and interviews, a conceptual framework of successful implementation of BIS is proposed. The framework summarizes CSFs of BIS based on project implementation life cycle (pre implementation stage, implementation stage and post-implementation stage) from managerial and technological perspectives. Finally, results, suggestions and directions for future researches are discussed.

**Index Terms:** - Business Intelligence System, Critical success factors, BIS implementation, Conceptual framework.

## 1 INTRODUCTION

DEVELOPING a business intelligence system (BIS) is a complex undertaking requiring resource process. If the BIS implementation is executed successfully, then it can be assumed that the BIS process and products will be efficiently delivered [1]. There are only limited authoritative numbers of critical success factors (CSFs) that are identified for management reference [2]. Currently, a gap exists between academia and practitioners regarding the discovery of factors that influence on BI system's success [2]. As with other IT enterprise solutions, BIS implementation will have different results in different companies, with some organizations reporting BIS as a success and others report that BIS was a failure. For example, Continental Airlines achieved a 1000% return on investment (ROI) of BI in revenue and produce cost savings [3, 4]. Less successful companies spend more on resources compared with their competitors and have a correspondingly smaller return on investment. [4, 5] This paper focused on the project life cycle of a BIS project, and classified BIS project implementation in three stages which included a pre implementation stage, an implementation stage and a post-implementation stage.

This paper also developed a conceptual framework for the successful implementation of BIS with a focus on the managerial and technological dimensions of BIS projects based on the current literature and interviews. The first section of this paper introduced BIS as an essential IT solution for organizations and it also briefly described the BIS processes. The second section discussed the BIS Project Implementation Processes and BIS success issues. In the third section Critical Success Factors for BIS Implementation were identified. The fourth and final section explained the Conceptual Research Framework, drew conclusions and discussed future research.

## 2 BUSINESS INTELLIGENCE SYSTEMS AND ORGANIZATIONS

Business Intelligence Systems (BIS) enhance organizations with abilities of understanding internal and external environment through the systematic acquisition, collation, analysis, interpretation and exploitation of information. BIS uses two types of tools [6]. The first class of tools is built on database management system to analyze huge operational databases [7]. The second class of tools, called competitive intelligence tools, assist organizations in decision making processes in the marketplace [8]. Organizations with the lack of actionable information need Information Systems (IS) that enhance them to gain a better perception on environmental forces and improve their performance by producing useful information. Therefore, global interest in intelligence technology has increased significantly [9]. BIS is an intelligent IT solutions that organizations can rely on to satisfy these needs [10]. Furthermore, research was conducted by Technology Evaluation Center (IT solutions consultant and research center) shows; there is stability in the demand for BIS solutions in the current competitive marketplace also number of BIS projects over the last 5 years has increased in a linear fashion However, it is expected that in the future, there will be a slower but steady growth in the demand for these systems [11].

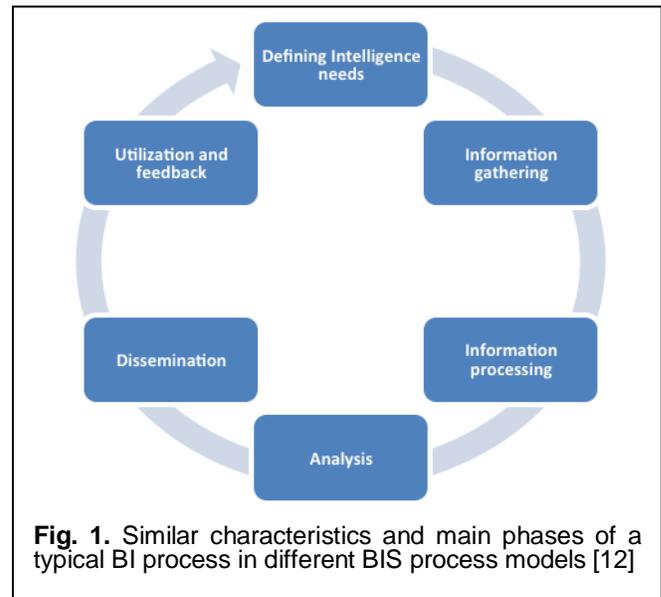
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### 3 RESEARCH METHODOLOGY

This paper follows Juha and Virpi who describe the BIS concept as a systematic process for “acquiring, analyzing and disseminating a company’s strategic and operational information”[12]. In addition to develop a conceptual framework for CSFs of BIS projects, an adopted project life cycle which includes BIS project implementation processes is proposed. In order to identify the CSFs, an interpretivism paradigm and qualitative approach were employed. Data was collected from an extensive review of the literature review and interviews. The literature review includes three steps: In the first step, BIS articles published in leading journals that addressed BIS research and articles related to IS implementation were accumulated. To accumulate BIS related articles the list of articles that provided by Jourdan, Rainer and Marshall [4] acted as a guide but additional papers on IS implementation, current articles, and studies on BIS were also considered. In the second step, twenty-seven relevant papers were selected based on the classification and refining process in the accumulated articles or study. The third step is including a categorization process, which categorized papers of second step based on this research and paper structure. The interviews were conducted with people who had experience in IS and BIS. Interview questions were influenced by the literature review and each interview included specific questions related to this study. The interviewees were selected from two groups. The first group included people who had a technical background and the second group included managers and BIS stakeholders. Finally, a cross-case analysis was done to examine the CSFs. This information was used to develop a refined CSFs conceptual framework.

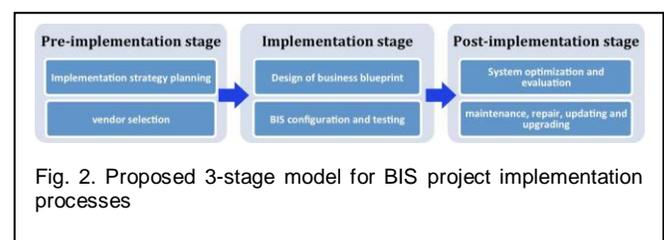
### 4 THE BIS PROCESS

Researchers and companies have presented many different models for the BIS process [12-15]. Most presented a cyclical model and followed the same object. The object is to refine usable intelligence for decision making from information. A BIS process can be an ad hoc process or it can be systematic in nature. An ad hoc process helps companies to obtain the information needed for a precise and one-time intelligence need. On the other hand, a systematic process helps companies identify trends and discover new business opportunities by continuously collecting information concerning their competitors and the overall business environment [12]. The similar characteristics and phases of the BIS process models are illustrated in Fig.1 [12]. At first, the intelligence needs of decision makers must be defined by discovering the key intelligence topics and questions based on qualitative or quantitative information, which is collected from suitable sources. Then, in the information processing phase, the collected information is refined. Next, the refined information is enriched, analyzed, and turned into usable intelligence using various analysis methods. In the following phase the intelligence is delivered to whom the intelligence has additional value in decision-making in the form of a report, newsletter or through the company’s intranet or portal and official forms. Finally, the last step is the utilization of the intelligence that created during past steps. BIS feedback achieved based on the quality and accuracy of the created intelligence [12, 14-16].



### 5 BIS PROJECT IMPLEMENTATION PROCESSES

Implementation of BIS follows other IT solutions in an organization. Previous studies described the implementation process of the Enterprise Information Systems, such as Enterprise Resource Planning (ERP), using models that have between three and six stages [16, 17]. Based on these studies and project life cycle, this paper proposed an adopted three-stage process model for BIS implementation that includes the pre-implementation stage, implementation stage and post-implementation stage (Fig.2). The first stage combined the broader business focus of the Markus and Tanis chartering phase[16] with the Ross design phase [18]. For more description this stage included an implementation strategy that explained the changes to ensure that they aligned with the overall corporate strategy. This stage also determined the organizational principles and implementation approach. The second implementation stage contained a design of the business blueprints, the configuration, and the testing of BIS. The final stage was a post-implementation stage and it included two kinds of processes; system optimization and keeping system go-live (maintenance, repair, updating and upgrading).



### 6 SUCCESS MEASURES FOR BIS IMPLEMENTATION

Over the past few years, most IT investment was incurred to create useful systems for the day-to-day management of operations and to create useful and frequent reports [19]. The lack of debate in BIS investment shows the importance of BIS for organizations [10, 19, 20]. In the real world, however, a successful project must be completed within budget and according to schedule while functioning as required. In addition, stakeholders believe that success is achieved when

the organization can perform all its business processes better than before. The six dimensions of IS success, introduced by Delone and McLean, are system quality, information quality, use, user satisfaction, individual impact and organizational impact [17, 21]. But, The definition and measurement of the success of an information system are difficult. The success of IS depends on the researcher , different point of views and can be subjective. Thus, there are no agreed measures used to define the degree of success obtained from the implementation of an information system [22]. BIS as an information system so, in practice, there is no suitable model for measuring BIS success [10, 23, 24]. This paper investigates the process of BIS. Based on process viewpoint, success changes as the project implementation stages, thus, every stage have its own success measures [17]. Based on literature review and interviews, following measures are suggested in this paper: At the pre-implementation stage, success can be measured by the degree of organizational readiness and the competency of the BIS package, consultants, and service vendors. At the implementation stage, completion of the BIS project according to the predefined standards, by the deadline and within budget are the primary measures of success. On the post-implementation stage, user satisfaction and the perceived contribution made by the BIS to organizational performance is the primary marker and measures of success. At each stage, success was assessed both from the perspective of information technology (IT) and the managers in the organization.

**7 CRITICAL SUCCESS FACTORS FOR BIS IMPLEMENTATION**

Critical success factors were defined as "those few critical areas where things must go right for the business to flourish"[25]. In order to identify the critical success factors for BIS, a recent study (2010) published by William Yeoh and Andy Koronios , introduced seven authoritative CSFs for BIS systems [2]. These factors are: (1) committed management support and sponsorship; (2) a clear vision and well established business case; (3) business oriented championship and a balanced team composition; (4) user oriented and friendly technologies; (5) sustainable data quality and quantity; (6) business-driven and iterative development approaches; and (7) business driven scalable and flexible technologies [2]. The literature review and extensive interviews revealed that there were CSFs that were common to all information systems. These CSFs are: (1) Top management support [17, 22, 26, 27], (2) Clear goals and objectives [2, 17, 22, 26, 27], (3) Effective project management [17, 26, 27], (4) The culture of the organization [26, 28], (5) User education and training [17, 27, 28], (6) stakeholders active involvement [17], Data and information accuracy and integrity [17, 26, 27], Enterprise IT infrastructure and legacy system [2, 17, 29], Suitability of hardware and software [17, 26], System reliability and flexibility [17, 26] and (12) System perceived usefulness and learnability [30]. This study divided the CSFs into two groups based on the managerial and technological dimensions of the BIS projects. Fig.3 outlines the critical success factors for a BIS that resulted from the interviews and literature review.

**8 CONCEPTUAL RESEARCH FRAMEWORK**

In order to identify CSFs of BI systems; this paper applied two approaches. This study was conducted according to research

methodology steps and the final CSFs were categorized in three groups based on the BIS project stages and the conceptual research framework is figured out. (Fig.4) The framework is based on the project life cycle approach, and it is emerging the CSFs in all three stages (pre-implementation, implementation, and post-implementation stage).

**8.1 CONCEPTUAL RESEARCH FRAMEWORK**

First, an organization must have a precise, strategic thinking, and then the organization should evaluate its readiness for the changes that would occur. Thus, factors such as clear vision and mission (goals and objectives), organizational culture and IT skills in an organization should be considered. During pre-implementation stage; process requirement needs and Potential software packages, which are best fit to these needs, should be identified. To increase the chance of success, two points should be remembered when selecting software and hardware: (1) the suitability of the software or hardware with the needs of the organization and (2) the ease with which the software or the hardware can be customized. It is also important to select a qualified BIS vendor and service consultants who can provide continuous support throughout the life of the system.

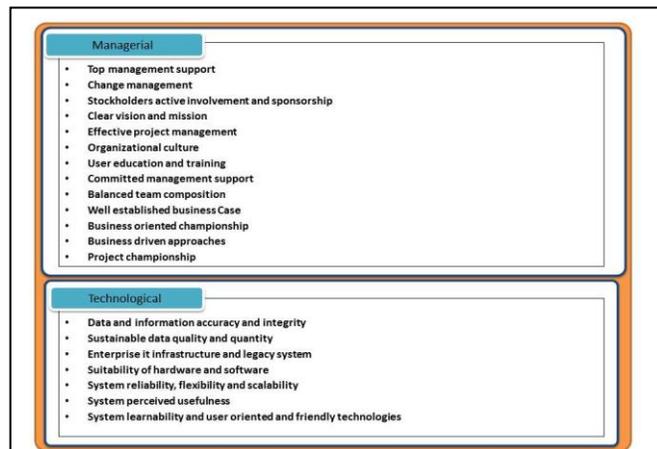


Fig. 3. critical success factors of BI system

Stages	Pre-implementation		Implementation		Post-implementation	
	Implementation on strategy planning	vendor selection	Design of business blueprint	BIS configuration and testing	System optimization & evaluation	maintenance, repair, updating and upgrading
Success Measures	<ul style="list-style-type: none"> <li>Organizational readiness</li> <li>Competent BIS package</li> <li>Consultant and Service vendor</li> </ul>		<ul style="list-style-type: none"> <li>Completion of the BIS project</li> <li>According predefined standards</li> <li>On time</li> <li>Within budget</li> </ul>		<ul style="list-style-type: none"> <li>User satisfaction</li> <li>Perceived contribution of the BIS to organizational performance</li> </ul>	
Critical Success Factors of BIS	<ul style="list-style-type: none"> <li>Suitability of software and hardware</li> <li>IT skills in organization</li> <li>Qualified BIS Vendor and Service Consultant</li> </ul>		<ul style="list-style-type: none"> <li>Data accuracy and integrity</li> <li>Adequate IT infrastructure, and legacy systems</li> <li>Hardware, software and network reliability, flexibility and scalability</li> <li>Change management</li> <li>Stakeholder active involvement</li> <li>Top management Support</li> <li>Effective project Management</li> </ul>		<ul style="list-style-type: none"> <li>Perceived usefulness</li> <li>Learnability and user oriented and friendly technologies</li> <li>Users training and Education</li> </ul>	
Managerial	<ul style="list-style-type: none"> <li>Clear vision and mission (goals and objectives)</li> <li>Organizational culture</li> <li>Committed management Support</li> </ul>					

Fig. 4. conceptual research framework CSFs of BIS

## 8.2 CRITICAL SUCCESS FACTORS IN THE IMPLEMENTATION STAGE

Generally, resistance to change is one of the obstacles facing the implementation of new technology in an organization. To overcome this obstacle, any changes to the business processes must be managed and continued support from top management is necessary. So, effective project management is important to achieve BIS success. To facilitate the implementation process, and speedy and successful implementation of the BIS, users and other stakeholder should be involved in the implementation team from the beginning of the project. From the technical perspective, data accuracy and IT infrastructure are also two key determinants of BIS success. Inaccurate data input will adversely affect the functionality of the whole system; so, data must be cleansed to ensure that there will be no disruption to BIS performance. BIS implementation is a complex transition from legacy information systems to an integrated and high technological IT infrastructure. Thus, adequate IT infrastructure, hardware, software and networks will affect the quality of the BIS and are crucial to its success.

## 8.3 CRITICAL SUCCESS FACTORS IN POST-IMPLEMENTATION STAGE

BIS is similar to other Information Systems in that user training and education is an important factor of a BIS success. Many projects fail in the end due to a lack of proper training for their users [17]. Good quality training makes the user comfortable with the system and it increases their expertise and knowledge. BIS system features and hands-on-training are important topics for end users. The perceived usefulness of a BIS and its learnability are determinants for end-user acceptance and are measures of a successful implementation.

## 9 CONCLUSIONS

This study developed a conceptual research framework to identify factors that are critical in BIS implementation. The framework gathered critical success factors and divided them into management and technology categories. This framework assisted both practitioners and academicians by presenting insights on how to better implement BIS and the critical factors that need to be focused on in each stage of the implementation. The framework identified critical constructs that can be used by academicians for further empirical studies. Moreover, more empirical research needs to be conducted to better understanding of the different roles played by various stakeholders and how these stakeholders evaluate the success of a BIS implementation.

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